

## THE MITRE CORPORATION

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30 April 1973

D22-1573

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Mr. Arthur Fihelly, Code 430  
ERTS Technical Officer  
National Aeronautics and Space Administration  
Goddard Space Flight Center  
Greenbelt, Maryland 20771

Re: BI-MONTHLY PROGRESS REPORT, PR-568/MMC# 200, Environmental  
Indices from ERTS-1, NAS 5-21482

Gentlemen:

The MITRE Corporation is pleased to submit a progress report  
for the period of March 1973 through April 1973. To promote  
consistency and facilitate NASA review, MITRE has adopted this  
format for all future Type I Progress Reports.

A. TITLE:

Investigation of Environmental Indices from the Earth  
Resources Technology Satellites, PR-568/MMC# 200.

B. PRINCIPAL INVESTIGATOR:

Mr. Edward A. Ward  
Sub-department Head  
Environmental Systems

C. PROJECT OBJECTIVES:

MITRE will develop environmental indices covering land,  
water and air quality compatible with ERTS-1 imagery.  
Two sites in Pennsylvania have been selected for examination.  
Such indices will reveal the trends occurring in the environment  
and will prove useful to Federal, state and local governments  
in their management of the environment in other areas.

D. SUMMARY OF PROJECT STATUS:

- o The Data Analysis Plan received NASA approval and the  
Continuing Data Analysis Phase (Phase III) began in this  
time period. Completion of contract is December 31, 1973.

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CR-131543

(E73-10505) INVESTIGATION OF  
ENVIRONMENTAL INDICES FROM THE EARTH  
RESOURCES TECHNOLOGY SATELLITES Bi-monthly  
Progress Report (Mitre Corp.) 4 p HC  
\$3.00  
CSCD 08D 63/13 00505  
Unclass  
N73-22280

- o The two MITRE DCP's turned over to USGS/Harrisburg for inclusion into the Susquehanna River Basin network, have been installed at Newport and Towanda, Pennsylvania. Newport on the Juanita River is reporting water quantity without difficulty. The Towanda station on the East Branch of the Susquehanna is malfunctioning. USGS has not determined the problem at the present time.
- o A paper has been prepared on MITRE's Air Quality Indices effort to date for inclusion into the ERTS Symposium Proceedings, March 5 - 9. See "J" below for information regarding this citation. The paper was based on data from three overflight dates (August 1, October 11 and November 16, 1972). A fourth date (September 6) has since been analyzed and the result fell exactly where expected on Figure 19 of MITRE's Type II Progress Report.
- o Water quality analysis has been stalled due to a discovery of the effects of banding on MITRE's analysis of the CCT's. As reported in the last progress report (first Type II) a training reach had been selected in the adjoining frame to our Harrisburg test area for October 11, 1972. This shift was to allow us to develop our water quality signatures on a more homogeneous water target than the Susquehanna River around Harrisburg. The Potomac River from Hains Point to Colonial Beach was being analyzed with six levels of water turbidity being determined at Quantico Marine Base. However, as the test site was moved down the river to less turbid areas, the banding (a light line every sixth line) was of the same contrast as the horizontal turbidity variation. Attempts were made to strip the bad lines from the data (all four MSS channels) and analysis performed on the remaining mixed population. Approximately fifty percent of the sample was thus thrown away. Remaining population produced only two levels of turbidity where the imagery for channels 4 and 5 intimated there would be more. Conversation with ERTS User Services corroborated our findings and a fix to the cause of banding has been instigated. MITRE's water turbidity analysis thus has stopped until modified CCT's are received.
- o Land use efforts during the reporting period have been toward gathering and comparing in-situ land use data with the land uses deduced by analysis of the CCT's. The latest in-situ land use data (1966-1967) in our first test site (Harrisburg) covers 3 counties and is at present being compared with our ERTS land use descriptions defined for August 1, 1972 and October 11, 1972. No conclusion has been drawn at the present.

Land use in MITRE's second test site (Wilkes-Barre/Scranton) has begun for October 10, 1972 image. The major new land use categories here, not found in the Harrisburg site is strip mines and refuse banks. Seven and a half minute quad maps for the area are not adequate and effort is underway to pick one active strip mine, one passive but un-replanted stripped site and one passive and replanted stripped area. These areas will be used to train on for signature development. This effort is in progress at the close of this period.

- o Land use in Harrisburg area has been affected also by banding in the CCT's. The heterogeneous nature of land use as compared to more large water bodies makes the deduction more difficult but if banding corrections work, improvements of land use signatures may be expected in the future reporting period activities.

E. SIGNIFICANT RESULTS:

Correlation between the EPA/NOAA Atmospheric Turbidity Network data and the average greyness of ERTS image over the same test site gives promise of a use for ERTS as a source of mesoscale turbidity information. Care however must be given to avoid weather front and urban effect anomalies.

F. PROBLEMS:

Delay in the production of CCT's with banding removed has slowed our water and land use digital analyses. Improved tapes for October 11 for the Harrisburg and Washington scenes are expected momentarily from NASA User Services.

G. RECOMMENDATION FOR TECHNICAL CHANGES:

None at present. If banding reduction on CCT's is successful rework of other overflight dates will be requested.

H. ADEQUACY OF FUNDING:

No problems seen at this time.

I. CHANGES TO STANDING ORDER FOR DATA:

Change in standing order such that the four MSS images and the CCT's which pass MITRE criteria was requested and accepted during the period by the cognizant Technical Officer.

J. PUBLICATIONS IN THE REPORTING PERIOD:

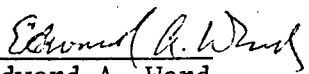
- o "Air Quality Indices from ERTS-1 Multi-Spectral Scanner Information, PR568", MITRE Report M73-4, April 1973. (To be published in ERTS-1 March 5-9 Symposium Proceedings).

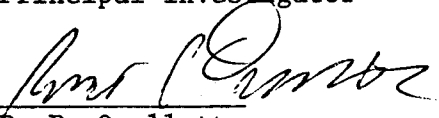
K. WORK PLANNED FOR NEXT REPORTING PERIOD:

- o Repeat of the Potomac water quality analysis on the improved CCT's (banding removed) for October 11, 1972 scene will be performed. Following success in handling this Potomac reach, the analysis will move to the mouth of the Susquehanna River and analysis of the turbid fan for October 11, 1972 will be made. Following success at the mouth, examination of the three dammed up areas of the river, twenty odd miles up stream, will be made and thus progress on up the river as far as our analysis will hold valid.
- o Land Use in the Wilkes-Barre/Scranton area for strip mines and refuse banks will continue.
- o Air quality analysis will await further clear (20% cloud cover) Harrisburg dates.

Questions concerning this report should be directed to the undersigned at (703) 893-3500, extension 2224, or to Mr. Edward A. Ward at (703) 893-3500, extension 2237.

Sincerely,

  
Edward A. Ward  
Principal Investigator

  
R. P. Ouellette  
Department Head,  
Environmental Systems Department

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cc: Mr. Michael Ciufolo  
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